Information and Technology Track

Using Information and Technology to Evaluate Environmental Risks

Regional Vulnerability Assessment (ReVA)

Issue: Population and economic growth in a region inevitably result in harm to ecosystems because of pollution, loss of habitat, and demands on natural resources. But which ecosystems are at the greatest risk from the sum total of these factors, and thus should be priorities for protection and restoration? ReVA is being designed to provide scientifically reliable answers to these questions for state and local officials who guide smart growth.

Activity: ReVA is funding a number of projects that will develop future growth scenarios, how these scenarios will change exposure of streams and their watersheds to pollutants, how habitat fragmentation will affect fish and wildlife, how disturbance will affect invasions by exotic species, and how all of these factors interact. This project is part of the CENR Integrated Science for Ecosystem Challenges program and an excellent example of its "Ecological Forecasting" initiative. The research is conducted by EPA staff, USGS, USDA, and STAR grantees.

Products: A report comparing the vulnerability of streams and forests to growth and development in the Mid-Atlantic states (EPA Region 3) will serve as a proof of concept in FY 2002. A more comprehensive assessment including all important ecosystems in the region is scheduled for FY 2006.

Impact: At the current time, there is no way of reliably comparing risks to all ecosystems resulting from the myriad of factors that accompany population and economic growth in a region. Without such techniques, efforts to protect and restore ecosystems will be piecemeal, and either ineffective or inefficient. ReVA will extend the benefits of "smart growth" to ecosystems, as well as humans.

GPRA:

Goal 8:	Sound Science
Objective 801	Ecosystem Protection and Restoration
Sub-Objective 80101	Measuring Exposure of Ecosystems

Contact: Betsy Smith, (919) 541-0620

Information and Technology Track

Using Information and Technology to Evaluate Environmental Risks

Using Biological Indicators as Signals of Watershed Health
U.S. Federal Government
Environmental Protection Agency

PROBLEM:

States, tribes, local governments and regional planning authorities need scientifically credible ways to measure the environmental risks of wastewater discharges and runoff, as well as changes in our landscapes due to growth and development. Effects of chemical pollutants and habitat changes may go undetected because they are not monitored or may have unpredictable patterns due to precipitation, intermittent discharges, or other factors. Agencies must credibly identify impaired waters and establish baselines to measure progress, and they are increasingly forced to defend their water quality assessments and management decisions in court.

INNOVATION:

EPA has been working with Regions, States, and Tribes to develop and implement biological criteria through systematic approaches and scientifically credible methods. Indices of Biotic Integrity and probabilistic sampling designs are inexpensive innovations that provide greater confidence in our ability to accurately monitor and assess the condition of watersheds. We can now measure the progress of our regulatory and management actions, as well as Clean Water Act requirements. Indices of Biotic Integrity directly and accurately measure the health of the water resource and the “integrity objective” of the Clean Water Act, and probabilistic sampling eliminates the bias with site selection associated with many monitoring programs.

RESULTS:

A more accurate baseline of true water quality conditions allow more confidence that water quality problems will be identified and addressed through management actions and improve the targeting of resources for restoration.

- Using bioassessments changed Ohio EPA's 305(b) condition estimates from 91% full use attainment in 1986 to only 34% in 1988. Using these more accurate methods established a baseline to target improvements resulting in 54.5% of streams attaining their goals in 2000.
- Ohio EPA found that 41% of their streams passed chemical but failed biological standards, showing that biological criteria are critical to providing an accurate measure of water quality.
- Maryland implemented both biological indicators and a statistical sample design to characterize the state's streams and found that only 54% were in good condition compared with 94% in 1998 which were based on traditional reporting methods. Over 1,000 miles more of their streams were assessed for the 2000 report than the 1998 305(b) report.
- Delaware adopted both biological assessments and a probabilistic sample design and found that this sample design detected more waters that did not meet chemical standards (13% vs 76%); when also using biological assessments the waters not supporting aquatic life uses rose to 87%.

CONTACT:

Wayne S. Davis
U.S Environmental Protection Agency
OEI- OIAA - Environmental Analysis Division
Mid-Atlantic Integrated Assessment Team, EPA Biocriteria Team
410-305-3030 (davis.wayne@epa.gov)